



UNIVERSITY OF ILLINOIS EXTENSION

College of Agricultural, Consumer, and Environmental Sciences

Illinois Fruit and Vegetable News

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a newsletter for commercial growers of fruit and vegetable crops

"We are what we repeatedly do. Excellence, then, is not an act, but a habit." Aristotle

Address any questions or comments regarding this newsletter to the individual authors listed after each article or to its editor, Rick Weinzierl, 217-333-6651, weinzierl@uiuc.edu. The *Illinois Fruit and Vegetable News* is available on the web at: <http://www.ipm.uiuc.edu/ifvn/index.html>. To receive email notification of new postings of this newsletter, call or write Rick Weinzierl at the number or email address above.

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University of Illinois Extension Specialists in Fruit & Vegetable Production & Pest Management

Upcoming Programs ...

- **Illinois Small Farms Sustainable Agriculture Tour, May 4, registration from 9:00 to 9:30 a.m.**, at Spence Farms near Fairbury, IL. Marty and Kris Travis operate Spence Farm – the oldest family farm in Livingston County. Tour topics include vegetable and flower gardens and plantings of garlic, daylilies, paw paws, and wildflowers for propagating and seed. For more information, see: http://web.extension.uiuc.edu/smallfarm/pdf/2007-05-04_spence_farms_flyer.pdf. Registration is \$20.00 per person.
- **Managing Grape Vines After Freeze Damage, May 12, 10:00 a.m.**, Vahling Vineyard near Stewardson, IL (just north of Effingham). Dr. Paul Read, University of Nebraska, will be the featured speaker. Note the directions and details in Elizabeth Wahle's notes below.
- **Calhoun County Orchard Twilight Meeting, May 22, 6:00 p.m.**, Murray's Orchard, just north of Mosier, IL. From Hardin, go north to Kampsville, and turn left (west) on State Route 96. Follow the right hand turn to stay on State Route 96, and then turn right onto Crooked Creek Road (at the white church on corner). Go about a mile, and Murray's Orchard is the first driveway on the right. Ongoing management needs for freeze-damaged orchards will be among the topics to be discussed.

Regional Updates

In southern and southwestern Illinois, field work has been underway everywhere in the region. Vegetable production has started up again, both in replacing crops that were lost in the freeze and resuming regular plantings.

The Illinois Specialty Growers Association is going to send a letter to members of the Illinois Congressional delegation asking them to include Illinois' fruit losses in the disaster legislation currently being discussed in Congress. Thus, it is important for growers to file a notice of loss with their local FSA office if they have not done so already (regardless of whether or not you have NAP coverage). The FSA is assembling the loss information. There is no set date for providing this information to the local FSA office as with the NAP program, but the sooner the better.

The fruit crop situation in the southern region has not improved significantly. With a little passage of time, certain apple varieties have been found to have live buds, particularly Golden Delicious and Jonathan. It will still be a few weeks before fruit set can be evaluated on apples. Within a week of the freeze, grapes started showing varying degrees of injury to the wood, particularly young vines. Brambles are starting to recover in terms of leaf renewal, but it is still too soon to know the extent of an expected crop. The strawberry crop is probably the most variable, anywhere from partial loss of early flowers and fruit to complete burn down of the foliage.

For grape growers interested in learning about the effect of the freeze on grapes and how to manage vines after such a freeze, a meeting has been scheduled for May 12 at Vahling Vineyard in Stewardson (just north of Effingham). Dr. Paul Read, University of Nebraska, will be the featured speaker. The meeting will start at 10:00 a.m. Registration will be taken at the door and is \$20.00 per person, or \$25.00 with spouse. Lunch is included. From Effingham, take State Route 33 north and turn right (north) at State Route 32. Go approximately 7.3 mile on State Route 32 and turn left (west) on to Road 400 N. Vahling Vineyards is 1.25 miles west on the right (north) side of the road. From State Route 16, turn south at state route 32 and travel approximately 8.8 miles. Turn right at Road 400 N. Vahling Vineyards is 1.25 miles west on the right (north) side of the road.

The next twilight meeting for southern Illinois tree fruit growers has been scheduled in Calhoun County for May 22, at 6:00 pm, at Murray's Orchard just north of Mosier, IL. From Hardin, go north to Kampsville, and turn left (west) on State Route 96. Follow the right hand turn to stay on State Route 96, and then turn right on to Crooked Creek Road (white Church on corner). Go about a _ mile and Murray's Orchard is the 1st driveway on the right. Ongoing management needs for freeze-damaged orchards will be among the topics to be discussed.

Elizabeth Wahle (618-692-9434; wahle@uiuc.edu)

At the Dixon Springs Agricultural Center, some blueberry cultivars may have a light crop, although it still appears most will be lost. Growers in western Kentucky and southern Illinois are starting to pick a few plasticulture strawberries, and tomato transplants have been or are being set. It appears that some of the early-planted sweet corn that had emerged will survive the frost/freeze damage but this will result in first and second plantings being nearly identical in harvest date due to the setback experienced in the first planting. We anxiously await sunshine and warmer temperatures.

Many of you who remember J.W. "Bill" Courter, retired Extension Specialist – Fruits & Vegetables, may also remember his wife Treva. She often traveled with him to extension meetings. Treva was killed in an automobile accident on April 23. She had been a wonderful companion to Bill and did a great job keeping him in line. For those that would like to send a condolence card, Bill's address is J.W. "Bill" Courter, 3935 Kelley Rd., Kevil, KY 42053-9431.

Jeff Kindhart (618-695-2444; jkindhar@uiuc.edu)

In northern Illinois, cloudy days with highs in the 50s lows in the 30s have been common. Rainfall in the Chicago Metropolitan area has totaled about 2 inches so far in April, while counties to the south and west of Chicago have received more than 3 inches (over 2 inches of that on April 25). The cold temperatures experienced during the Easter weekend and subsequent days thereafter, coupled with extremely cold temperatures in February, resulted in a range of injury to fruit tree blossoms in northern Illinois. Peaches and some apple varieties such as Jonathan that had leaf buds _ - _ inch long were hurt most by the cold temperatures in April. The frost damage is still being assessed, and current reports indicate that king apple blossoms were most affected. However, further north, particular in McHenry County where apples and other fruit trees were still dormant when freezing temperatures occurred, injury was less severe and crop prospects are still being assessed. Field activity has been limited in the region, as the ground is still wet due to heavy rainfall. Some growers have planted cabbage, potatoes, and other cool-season vegetables. Warm-season vegetables such as tomato, peppers, cucumbers, and melons seedlings have been started in greenhouses.

Maurice Ogutu (708-352-0109; ogutu@uiuc.edu)

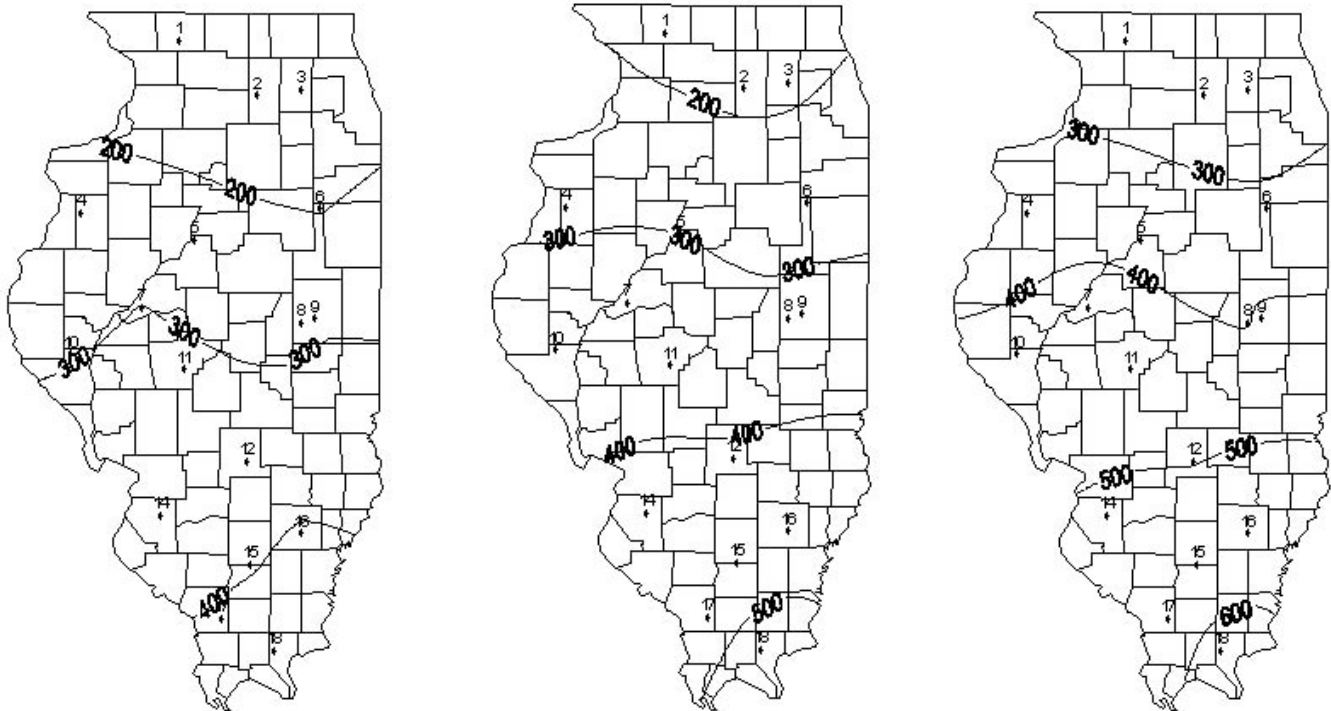
Degree-day Accumulations

Degree-day accumulations listed below for weather stations in the Illinois State Water Survey WARM data base have been summarized using the Degree-Day Calculator on the University of Illinois IPM site (<http://www.ipm.uiuc.edu/degreedays/index.html>). The list below includes only degree-day accumulations and projections based on a 50-degree F developmental threshold and a January 1 starting date, but other options that use different thresholds and specific biofix dates are available on the Degree-Day Calculator. The degree-day calculator is available as a result of a joint effort of current and former extension entomologists (primarily Kelly Cook) and Bob Scott of the Illinois State Water Survey. If you have questions about how to use the site, contact me or Bob Scott (rwscott1@uiuc.edu).

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Degree-day accumulations, base 50 degrees F, starting January 1.

Station	County	Base 50F DD Jan 1 – April 25, Historic Average	Base 50F DD Jan 1 – April 25, 2007	Base 50F DD Jan 1 – May 2 (Projected)	Base 50F DD Jan 1 – May 9 (Projected)
1. Freeport	Stephenson	176	133	175	235
2. Dekalb	Dekalb	201	139	183	249
3. St. Charles	Kane	186	151	188	245
4. Monmouth	Warren	241	232	280	350
5. Peoria	Peoria	266	247	300	375
6. Stelle	Ford	230	196	245	316
7. Kilbourne	Mason	337	301	359	440
8. Bondville	Champaign	281	268	319	393
9. Champaign	Champaign	283	293	345	421
10. Perry	Pike	327	294	348	423
11. Springfield	Sangamon	313	315	373	456
12. Brownstown	Fayette	372	345	409	496
14. Belleville	St. Claire	427	360	426	515
15. Rend Lake	Jefferson	452	393	464	561
16. Fairfield	Wayne	416	407	477	573
17. Carbondale	Jackson	457	407	474	565
18. Dixon Springs	Pope	486	449	522	619



Degree-day accumulations, base 50 F, from January 1 – April 25, 2007 (left), and projected through May 2 (center) and May 9 (right).

Notes from Chris Doll

The Easter Freeze of 2007 continues to be on the minds and in the pockets of most fruit growers. I hope that it was a once-in-a-lifetime freeze because of the width and breadth of the effects. Because phenological development had apples at or near full bloom, peaches at shuck split, grapes with 2-4 inches of shoot growth, blackberries pushed out with flower clusters, blueberries near full bloom, and early bloom on matted row strawberries, the extended cold with five to seven mornings of freezing temperatures down to 18-21 degrees killed most live tissue. Evaluation of crop damage continues, and more time is needed for full assessment except for the peach crop, which appears to be very sparse. In the Back-40, only a few fruits of Saturn and Raritan Rose can be found. A few apple varieties such as Jonathan, Pristine, Gala, Golden Supreme, and Honeycrisp kicked out enough side bloom that some crop is expected

if pollination occurs. American grapes are 100 percent lost, but are showing new buds. Blueberries have a few single live flowers that are insufficient to feed the birds, although some Nelson plants in Missouri appeared more viable due to late bloom. Early-developing blackberries are severely damaged, but some others may have some surviving shoots. The same is true for both red and black raspberries, although some were totally wiped out elsewhere. Unprotected matted row strawberries lost about 50 percent of the flowers and buds. A commercial field that was watered on seven nights fared only a little better.

So, what have we learned? In the *Fundamentals of Fruit Production* by Gardner, Bradford, and Hooker (McGraw-Hill, 1952), frosts and freezes were distinguished. Several pages covered frosts and how to counteract them, but the authors concluded that "against freezes, the grower is generally unable to contend by palliative methods." In other words ... unable to alleviate or mitigate the damage. They described a freeze as "the importation of cold air from other regions accompanied by high wind." The trip to the dictionary let me to several other words that described some of the post-freeze feelings ... depressing, despondent, disastrous, dire, dolorous (painful or pathetic), pitiful, wretched, and woebegone. We also learned that fruit growers are an optimistic group that will work with the surviving plant material to grow a better crop next year. Recording the episode verbally and pictorially may help future generations.

A number of things have been talked about in terms of what to do. Since most of the fertilizer applications have been made, vegetative growth should be good – and protected. Reduced spray programs may be needed to control the most serious insect and disease pests that reduce leaf or shoot growth during the year. Apogee applied to apples may help control some growth, and early applications may inhibit fire blight infections. Insects can be scouted and controlled if needed, whereas most disease control is preventative rather than curative. Insect-wise, in this area, codling moth catches began this week and the biofix dates will be established. I was able to find some live San Jose scale under scaly bark of older apple trees. No aphids have been seen to date.

Weed growth has not been too vigorous this spring with the cold temperatures and limited rainfall. But the April showers that are present this week will stimulate germination of seeds and growth of existing grass and weeds. The [Spray Guide](#) lists lots of options (and precautions) for both tree fruits and small fruits. The sterilant types of herbicides have somewhat of a built-in life expectancy based on rate and decomposition caused by light, temperature, and moisture. So, the longer you can delay the application in the spring, the longer the residual effects should last into the growing season. With the contact materials, earlier is usually better, as the coverage of the weed's foliage is easier.

Not many people grow horseradish, but the crop appears to have survived in good shape in spite of much leaf injury. The nut growers did not fare that well, as the hickories, pecans, and walnuts had floral organs killed. The most positive aspect of the freeze was that flowers of sweet gum trees also were killed.

Chris Doll

Fruit Production and Pest Management

What Happens to Fruit Tissues in a Freeze?

The severe weather we experienced earlier this month certainly has caused hardships for fruit growers, especially in southern Illinois. The central part of the state has also experienced some damage, particularly to grapes. The terminal buds on most grape canes were hit hard, but lower buds are starting to emerge. I have also seen similar damage on thornless blackberries. It appears that most of the severe damage is south of I-70. Apples are fairing a little better in the central and the northern parts of the state, at least for now. Many of the blossoms have opened but there is extensive damage to the petals and young leaves. Time will tell if honeybees will pollinate blossoms without petals or with damaged petals. Another problem that may occur, as a result of injury to the young leaves (see photo), is that we may see smaller fruit sizes because those leaves are essential for feeding the young fruits. The subject of this brief article is to explain how freezing kills living tissue. In general, cells die because water inside them (intracellular water) freezes. But, understanding why certain freezes kill trees is not easy. It is complicated by the fact that different varieties harden at different rates. Hardening can also be different within the same tree and the same tissue. Hardening is a process that a plant goes through to prepare itself for the winter so it can tolerate low temperature.

Cold hardiness or cold acclimation is a physiological change in a plant that allows it to tolerate otherwise injurious temperatures. Cold hardiness is believed to be genetically controlled, especially in acclimated plants. Hardiness occurs when a plant is exposed for a few days to temperatures slightly above those that normally cause injury. The cue for acclimation and eventual hardiness is cool temperature and day length. Plants start to acclimate when the days get shorter and cooler in the fall. Insect models offer the best example of cold hardiness and acclimation. Survival of the adults of the flesh fly *Sarcophaga crassipalpis* increased to 91% when they were acclimated at 0°C for as short as 2 hours and then transferred to -10°C compared to adults that were not acclimated. Acclimation can also be seen in tender plants such as tomato or pepper when the temperature drops gradually versus rapidly. When the temperature drops gradually these plants can survive a few degrees lower than when there is a sudden drop in temperature.



Freeze-injury to apple blossoms and leaves.

Several mechanisms have been proposed for plants that tolerate freezing. Some plants tolerate freezing by expelling water outside the cell into the extracellular spaces. The membranes of plants that tolerate low temperature are usually more permeable than those that do not. Survival also may be aided by a process known as supercooling. This results from lowering the freezing point within cells by accumulating one or more types of antifreeze (proteins or other cryoprotectants) or by dehydration of the cells. However, most physiologists agree that the crucial factor in winter injury is not low temperature, per se, but ice crystals that form inside the cells, causing their rupture. For any living organism to survive winter damage it has to prevent ice crystals from forming inside the cells. However, water freezing in the spaces between the cells (outside the cells) does not kill plants unless it is combined with ice forming inside the cells. Ice is formed around nucleating agents, which are very tiny particles inside the tissue. It is the same principle for rain formation and cloud seeding. Rain droplets form around microscopic particle – dust, smoke, salt crystals, soil and other materials that are present in the atmosphere – to form rain. Inside living cells, water also condenses around microscopic particles to form ice crystals. Fortunately, there aren't many floating microscopic particles in living organisms, but unfortunately it takes only a few ice crystals to form for the plant to freeze.

Interestingly, studies have shown that Antarctic micro-arthropods, only a few millimeters long, are the largest terrestrial animals that live year round on the Antarctic Continent. They survive low temperatures by a process known as supercooling, which involves reducing their freezing point to as low as -30°C in the winter by emptying their gut of food. However in the summer, when they start feeding, these insects were found to freeze at about -6°C , because of ice nucleating agents found on the particles of food in their gut. More recent studies have also shown that, in some organisms, digestive enzymes destroy ice-nucleating sites on the surface of food particles inside the gut and that allow them to survive lower temperatures. The process of supercooling can also occur in plants, as well, especially in plants that have small cells, limited intercellular spaces and plants that have low free water content. Remember the a few orange trees in Central Florida survived a freeze even though every tree around them had died. These trees survived because they were able to supercool. Supercooling is when the free water in the cell does not freeze at subfreezing temperatures. Most likely, these trees will die if they are exposed to the same temperature, unless they are able to supercool again. The reason those trees were able to survive may have been due to very limited free water in their cells at that time. Unfortunately, supercooling can only proceed to a certain steady-state level, which varies seasonally, depending on the condition of the plant, but after which freezing and death will occur.

In the spring, water starts to move into the tissues, causing them to become more tender and susceptible to freezing injury. Unfortunately, water inside actively growing plants does not supercool. Young tissue, including leaves and flowers, tend to have much more free water (90 to 95% free water) than older tissue. The more free water in the tissue, the more likely it will freeze at close to 0°C (32°F). Water movement into tissues is much faster on warm days than on cold days. For this reason, plants – even hardy ones such as apples – are more likely to be damaged by spring frost. There is nothing that can be done to force tissues back to their hardened state before the warm spill, especially in the spring. In the winter however, some hardy varieties may harden again after a short period of warm weather. However, if the warm weather persists for a while followed by a rapid freeze, then trees will start to die at 32°F or lower, even in the winter. A peach grower in southern Illinois lost more than two hundred trees due to an extended warm spill this past winter. The only thing that can be done to save the trees is to warm up the air to above freezing by heating or by spraying

water. As water freezes it releases heat of fusion. The released heat keeps the tissue from freezing and the ice serves as a blanket to protect the plants from lower temperature.

There are two types of freezes, advective and radiative. Advective freeze occurs when a frontal cold air mass, like the one we had recently, moves rapidly across the land mass. As we have seen, the mass of cold air tends to be turbulent and rapid and it does not allow for temperature stratification near the ground surface. It can also happen when the weather is cloudy. Usually advective freezes happen in the winter, which makes this freeze unusual. Mixing air during advective freezes with helicopters or fans does not help much, especially in the flat grounds of the Midwest. Heaters and sprinklers work best during advective freezes. Radiative freezes happen most often in the spring on calm and clear nights, as the ground cools it causes the air above it to freeze. Also, air drainage moves cold air from higher to lower elevations causing plants in low areas to die first. Mixing the air during radiative freezes may reduce tree damage.

Mosbah Kushad (217-244-5691; kushad@uiuc.edu)

Pruning Peach Trees that Have Lost Their Crop

Should you prune peach trees that have lost their fruits to the freeze? There is very little hard data on this subject, but knowing a little bit about tree physiology, I strongly recommend that you do not compromise pruning just because the tree does not have fruits. Pruning serves many purposes, including maintaining a balance between roots and vegetative growth. Most importantly, pruning allows light penetration into the canopy for maximum photosynthesis. Adequate photosynthesis is needed for flower bud formation in early summer. Also, if you do not prune the trees, chances are you will end up with a tangled mess the following winter. Summer pruning should also be used in nonbearing trees. Summer pruning encourages more flower bud formation. However, do not severely prune non bearing trees. Studies on citrus showed that severely pruned trees produce smaller fruits and lower return bloom. Only early spring nitrogen application should be eliminated in non bearing trees (and of course it's too late now for that decision), but fall nitrogen application should not be eliminated.

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Biofix dates for Oriental Fruit Moth and Codling Moth

Biofix dates for oriental fruit moth and codling moth are listed below for a few Illinois locations. A biofix is “an observable event used to indicate the date to start counting degree-days” for phenology models that use degree-days to predict and describe insect development over time. For oriental fruit moth and codling moth, the biofix is defined as the first significant and sustained flight of moths in the spring. I’ve listed “pre-freeze” and “post-freeze” dates for oriental fruit moth because it’s unclear whether moths or eggs present before the freeze would have survived to initiate the season’s population cycles.

Location	Biofix Date for	
	Oriental Fruit Moth	Codling Moth
Dixon Springs	27 March / 17 April	Not available
Belleville	1 April / 13 April	23 April
Brussels (so. Calhoun County)	30 March / 16 April	Not available
Urbana	20 April	Not available

For oriental fruit moth, first-generation larvae usually are not targeted for control even where a crop is anticipated, as this generation tunnels into new shoots, not fruit. Shoot injury usually is not a significant concern at this time, and sprays applied against plum curculio or stink bugs and plant bugs give some control. Given no need for curculio or stink bug/plant bug sprays in the absence of a crop, more than the usual amount of oriental fruit moth damage to shoots might occur in orchards not treated with insecticides. If shoot damage seems excessive (hard to define or predict), then control might be warranted, but excess shoot growth is likely in the absence of a crop, so oriental fruit moth tunneling in shoots may provide some necessary pruning. Time will tell. To estimate DD accumulations for oriental fruit moth in your area based on a 45-degree F threshold, consult the [Degree-day Calculator](#).

For codling moth, the timing of cover sprays following biofix differs according to the insecticide to be used (see page 15 of the [2007 Tree Fruit Spray Guide](#)). Labels for Rimon and Intrepid suggest earliest application timing; labels for the neonicotinoids list slightly later timings (150-250 DD base 50 F); and several other insecticides are labeled for application by 250 DD (base 50F) after biofix. Where a spray for plum curculio is applied at petal fall, be sure to consider its effectiveness against codling moth and delay or move up your first codling moth spray accordingly. Codling moth egg hatch begins at 240 DD base 50F after eggs are laid (assumed to occur almost simultaneously with biofix) ... if the product you apply will kill newly hatched codling moth larvae, that's the time you initially need to have it on the fruit. Remember, if you're managing a short crop because of freeze damage, your codling moth control program has to be just as good as would be needed for a full crop.

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Vegetable Production and Pest Management

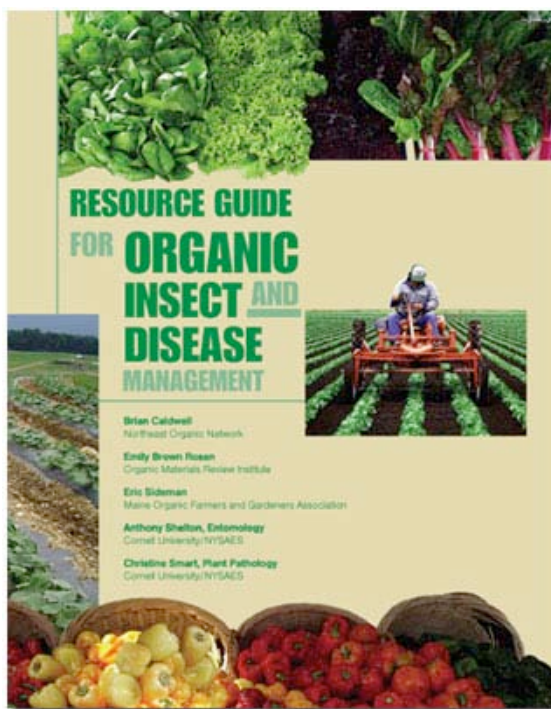
Black Cutworm Update

Ron Hines' [reports from pheromone traps in southern Illinois](#) indicate significant flights of black cutworm moths arriving in Pope, Pulaski, and St. Claire counties during the last 2 weeks. Sweet corn growers are advised to scout newly emerging fields once or twice weekly through the 3- to 5-leaf stage and treat if more than 3% of plants are cut and cutworms are still present and feeding. Do not assume that seed treatment insecticides will provide adequate control of cutworms ... scout anyway. Effective insecticides for cutworm control in sweet corn include Capture, Lorsban, Baythroid, Asana, Warrior, and Pounce (and the generic products that contain the same active ingredients).



Black cutworm moths (left) and larva with cut plant (right).

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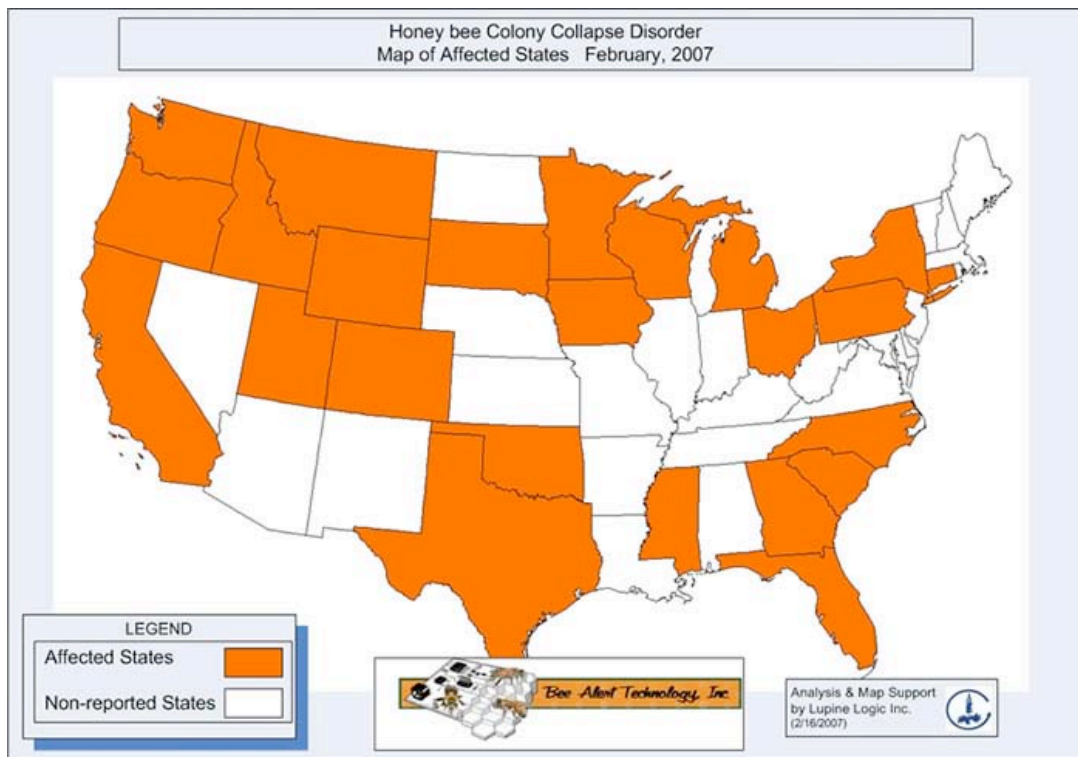
Resource Guide for Organic Insect and Disease Management is the title of a 169-page reference published by the New York State Agricultural Experiment Station. It covers crop management practices for cabbage family crops, vine crops, lettuce, solanaceous crops, and sweet corn and includes sections with photos of key insects and diseases, fact sheets on pesticides that may be used in

organic production, and appendices on resistant varieties, habitats for beneficial insects, trap crops, pesticide regulations, and additional topics. The organic pesticide fact sheets are especially valuable. This publication is available in its entirety on-line at: <http://www.nysaes.cornell.edu/pp/resourceguide/index.php>. It's also available for purchase in print at \$15.00 per copy plus shipping and handling. Orders can be placed on-line at <https://www.nysaes.cornell.edu/store/catalog/> or by mail to the New York State Agricultural Experiment Station, 630 West North Street, Geneva, New York 14456.

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Colony Collapse Disorder of Honey Bees

This week's *Vegetable Crops Hotline* (<http://www.entm.purdue.edu/entomology/ext/targets/vegcrop/VCH2007/VCH476.pdf>) from Purdue University includes a very informative article entitled "What's Happening to Our Honey Bees?" by Greg Hunt. Greg's article includes links to observations by James Tew of Ohio State University (<http://www.orsba.org/htdocs/download/Dtew.htm>) and Zachary Huang of Michigan State University (<http://cyberbee.net/ccd.html>). Dr. Huang's site includes the following map of reports of colony collapse disorder, and although neither Illinois nor Indiana is shown as an affected state, several nearby states have reported serious losses. Most Illinois vegetable and fruit growers depend on honey bees for pollination, so your continued attention to this topic is warranted.



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Words of Wisdom ... using the right words matters ...

Press stories indicate that Beijing, China, is attempting to correct a number of incorrect Chinese-to-English translations on store-fronts and businesses in advance of the upcoming Olympics. A few that definitely would benefit from correction ...

- In Chinese, the sign meant the equivalent of "Proctologist." The translation that might benefit from a little fixing reads "Doctor for Anuses and Intestines."
- The translation for "mouthwatering chicken" ... "saliva chicken" just doesn't quite trigger the same reaction.

- Sometimes it’s just a spelling matter. You can probably guess what was intended by “succulent noodles and crap.”

Closer to home, how about these lines from what one would assume were probably unsuccessful job applications ...

- I’m *attacking* my résumé for you to review.”
- “I prefer a fast-*paste* work environment.”
- “My work ethics are *impeachable*.”
- “I speak English and *Spinach*.” (Well, this might work if the job is to portray Popeye.)

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